

2.5 External Factors

External factors affect the type of research conducted, the way it is conducted, and the extent to which it will improve mining safety and health, as illustrated in Section 2.2. These factors and examples of their impact on the NIOSH mining program are presented in this section.

The priorities of the NIOSH mining program are derived from surveillance data, stakeholder input, and loss control considerations. There are other external factors which can require major changes in the direction of the research program. In general these factors are beyond the control of NIOSH, and in many cases are very difficult to predict. Some of these factors include:

- Political shifts
- Legislation
- New or modified regulations
- Global economic conditions and commodity prices
- Technology changes
- Major mining disasters

These external factors are not independent, and changes in one are often likely to affect other factors. For example, changes in economic conditions can affect mining employment and production, and also lead to political change.

The major political change affecting the direction of research is usually a change of the political party in control of the executive and/or congressional branches of the federal government. Political swings can affect the size of the NIOSH mining research budget. The relative emphasis on regulatory enforcement versus technical assistance with compliance has a very great effect on MSHA, and can also affect NIOSH mining research priorities. The relative needs for research on control technology versus surveillance research are somewhat dependent on the political and regulatory climate. The relative proportion of basic and applied research can also be affected by the political ideology of the administration in control of the federal government. For example, during the Reagan administration many applied research projects were terminated or not initiated at the direction of the President's Science Advisor, who stated that federal agencies outside the Defense Department should do only basic research. Administration policy was that applied research, including mining safety and health, should be left for the private sector.

Major mining legislation such as the mining safety acts of 1969 and 1977 has caused major impact on mining research. Both of these laws authorized immediate, large increases in the funding for federal mining health and safety research. Other possible future legislation that could affect mining could be environmental (e.g. global warming) or significant changes in the 1872 federal mining law. Any legislation having impact on the economic conditions of mining could also eventually affect the direction of mining research.

Regulatory proposals and changes by MSHA can have very direct effect on research priorities. The regulatory changes usually result in part from advances in technology, some of which may have resulted from NIOSH research. The regulatory changes in turn can create needs for new research. For example, changes in the regulations for noise and diesel particulate in recent years have had major effects on the direction of NIOSH mining research in these areas. Stricter regulations have increased the priority of research on control technology needed to enable compliance with the noise and diesel particulate regulations. As a result, NIOSH has greatly increased the staffing and discretionary funding assigned to these research areas since the new regulations were first proposed.

The economic conditions of the mining industry depend primarily on supply and demand for the product as well as the cost of producing the product. Supply and demand depend on national and world economic conditions. Metals are traded world-wide and prices of metals determine whether metal mining can be done profitably in the U.S. Mines limit or expand production and employment based on swings in the commodity prices. The price of coal and the economic health of the coal industry is affected by the supply of competing energy sources, especially natural gas. Any major change in the regulation and acceptance of nuclear energy for electricity generation could have long-term implications for the demand for U.S. coal production. Production costs can be affected by regulatory and technology changes, among other factors. The economic strength of the industry affects mining employment and the ability of the industry to employ more costly health and safety control technologies.

Long-term research planning is generally based on the assumption of stable funding for the program. Unexpected demands on the federal budget put pressure on other existing federal programs, including NIOSH research. These budget pressures can be caused by any weakness of the U.S. economy and resulting declines in federal revenues. Increased spending due to war or major disasters may increase budget deficits and the need for reductions in existing programs. Sometimes the Congress reacts to budget deficits by general across-the-board cuts in most federal programs. This has the effect of eroding the discretionary funds available for research.

Some of the most significant changes in mining in the past few decades include the shift from underground to surface coal mining and toward longwall mining of underground coal, the increase in underground stone operations, and the increase in independent contractors. These shifts in mining methods have resulted in large increases in production and decreases in mining employment, while the shifts to underground stone introduced new safety and health challenges for workers in that sector. The shift to independent contractors as well as other demographic changes has created new demands on training and other interventions. Other new technologies developed outside of mining find application in the industry. Sometimes these new technologies may be used to help control existing health and safety hazards, but they also may create new hazards. Developments in electronics and computer technology have been incorporated in mining, affecting both productivity and the nature of some of the mining hazards, as well as technology for controlling hazards.

Major mining disasters such as the Farmington coal mine explosion in 1968 and the Sunshine Mine fire in 1972 led to the Federal Coal Mine Health and Safety Act of 1969 and the Federal Mine Safety and Health Amendments Act of 1977. Major mine disasters are fortunately much less prevalent than in past decades, but if they do occur, they could lead to shifts in research priorities depending on the nature and cause of the disasters. The most recent example of this is the mine explosion at the Jim Walter mine in 2001, which focused attention on a wide range of emerging technical deficits that could be addressed through NIOSH research. This had a significant impact on the direction of disaster prevention research within the NIOSH mining program.

The ability to conduct effective mining safety and health research depends heavily on gaining access to mine sites and having the full cooperation of the mine operator. In many cases the in-mine research can be burdensome on the operators, despite the best efforts of the researchers, due to interference with normal maintenance, supply, or production operations, and it sometimes requires significant contributions of time and materials. Accordingly, most projects require a significant commitment from the operators. Routinely, many operators are proactive and make such a commitment to NIOSH mining research. Proposed or recently enacted legislation often serves to increase the interest in cooperating on NIOSH projects. In the end, the involvement of labor, industry, and manufacturers is generally necessary to execute the research program.

Translation of the research findings into practice is influenced by many of the external factors described previously. The value of the findings to solve real-world problems, as viewed by labor, industry, and other stakeholders, must be high enough to capture their interest. If the findings fill knowledge or technology gaps related to compliance with new regulations, then stakeholder participation tends to be very high. Economic conditions within the industry affect the number of new initiatives that NIOSH can launch in partnership with the industry and manufacturers, and they affect the degree of participation by the stakeholders. The degree to which MSHA utilizes NIOSH findings in developing regulations or in recommending compliance assistance initiatives affects the translation of NIOSH research products.

Although external factors are outside of the control of NIOSH, we have taken steps to minimize their impact on our ability to serve our customers and stakeholders. These include:

- Developing research program priorities to ensure that highest priority work is continued during periods of decreasing budgets;
- Working in partnership with customers/stakeholders from project conception to translation to ensure the relevance and quality of the work, to improve resource utilization, and to facilitate translation of the findings into practice;
- Maintaining flexible project planning processes to accommodate changing economic conditions and interests to ensure that opportunities are not missed and work is not continued if critical manufacturer or industry support is required;
- Working with MSHA to plan high-priority efforts that will provide timely input into its regulatory processes and collaborating with the agency on technology transfer efforts that will expedite the introduction and adoption of NIOSH products;
- Emphasizing quality and timely "customer service" to earn the trust and support of the mining program's customers and stakeholders, and serving as the "honest broker" in the execution of our mission to minimize the effects of political shifts on the program.

Over the past five years, the most influential external factors were the budget swings and the changes in mining regulations. The decline in discretionary funding limited our ability to respond to customer needs across all aspects of industry, although the highest priority areas were well served. Changes in regulations served to focus attention on important areas, and resulted in significant shifts in our research program. As a consequence of this, significant advances have been accomplished in a timely manner. The least influential factor was political shifts. In total, the external factors have resulted in a net positive effect on the Mining Program.